ENVIRONMENTAL CONSULTING SERVICES

PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT

1294-1300 Pittwater Road and 2-4 Albert Street,
Narrabeen NSW 2101

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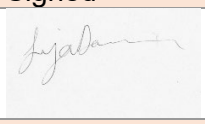
Lisa Danzey Environmental Scientist	06/04/2020	
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Executive Summary

Environmental Consulting Services Pty Ltd (ECS) was engaged to undertake an environmental assessment of the property known as 1294 – 1300 Pittwater Road and 2 – 4 Albert Street in Narrabeen. The purpose of this assessment was to evaluate the potential for contamination resulting from past Site activities and to draw conclusions regarding the suitability of the Site for redevelopment for residential purposes.

It is understood that the Site will be developed for residential use with the construction of multi-level buildings with basement car parks.

The scope of work undertaken to meet this objective included the review of background information, the excavation of 7 test pits and two boreholes and with the collection of selected soil samples.

The history of the Site indicate residential activities have been primarily conducted at the site which have a low potential to result in contamination.

The sampling and analysis of surface material across the Site has shown that levels of potential chemical contaminants are all below the Site Assessment Criteria.

The Site is considered suitable for the proposed development.

TABLE OF CONTENTS

1.0 INTRODUCTION

Environmental Consulting Services Pty Ltd (ECS) has been engaged to undertake a Preliminary Environmental Site Assessment at 1294-1300 Pittwater Road and 2-4 Albert Street in Narrabeen (the Site). The purpose of this assessment was to evaluate the potential for contamination resulting from past activities and to draw conclusions regarding the suitability of the Site for residential development of the land.

The proposed development at the Site is expected to include multi-level residential buildings over a basement car park with some commercial areas at the northern corner of the Site.

This investigation has been undertaken in accordance with the following:

- Guidelines for Consultants Reporting on Contaminated Sites (NSW EPA, 2011);
- National Environmental Protection (Assessment of Site Contamination) Measure 2013; and
- Managing Land Contamination Planning Guidelines SEPP 55–Remediation of Land

Site inspections, soil sampling and laboratory analyses were performed as part of this study. Best professional judgement was used to interpret and extrapolate between sampling points, however even under ideal circumstances actual conditions may vary from those inferred to exist. The actual interface between materials and variation of soil quality may be more abrupt or gradual than the report indicates.

This report has been prepared to evaluate the potential for contamination, if any, on the Site. ECS is not aware of any previous investigations that have been conducted at this Site.

1.1 Objectives

The primary objective of the investigation is to provide a qualitative assessment of the environmental conditions at the Site, the potential for Site contamination resulting from past land use and to consider the suitability of the Site for the proposed development.

1.2 Scope of Work

The scope of the work undertaken to meet the objectives included the following:

- A review of past land use(s) based on historical records and historic aerial photographs;
- Assess the site conditions and use(s) via a site walkover inspection;
- Identify potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC);
- Prepare a conceptual site model (CSM);
- Collection of surface soil samples and selected deeper soil at various locations across the Site;
- Laboratory analysis of the soil samples for common contaminants and the deeper sample for acid sulfate soil;
- Preparation of a site assessment report; and
- Assessment of the suitable of the Site for the proposed development with respect to contamination.

2.0 SITE INFORMATION

2.1 Site Identification

The location of the Site is presented in Figure 2.1 the Site identification details summarised in Table 2.1.

Figure 2.1 – Location Plan (Six Maps)

Table 2.1 – Site Identification

Attribute	Detail
Site Address	1294-1300 Pittwater Road and 2-4 Albert Street, Narrabeen 2101
Lot & Deposited Plan	4 Albert Street, Narrabeen: Lot 8C DP 200030; 2 Albert Street, Narrabeen: Lot 1 DP 613541; 1300 Pittwater Road, Narrabeen: Lot 1 DP 615179; 1298 Pittwater Road, Narrabeen: Lot 100 DP 773884; 1296 Pittwater Road, Narrabeen: Lot 6A DP 200030; 1294 Pittwater Road, Narrabeen: Lot 2 DP 84490.
Current Land Use	Residential, Commercial, Medical Practitioners
Proposed Land Use	Residential
Local Government Authority	Northern Beaches Council
Current Zoning	R3 – Medium Density Residential
Site Area (m2)	4687
Geographical Location (approximate centre)	Latitude: -33.714609583 Longitude: 151.297822585

2.2 Site Location and Regional Setting

The Site is located in a mixed commercial and residential area of Narrabeen with Albert Street to the north, Pittwater Road to the west with a playground across the road, and residential premises to the east and south. The Site is irregular in shape with the following boundary lengths:

- Northern boundary to Albert Street of 75m;
- Western boundary to Pittwater Road of 61m;
- Southern boundary of 67m; and
- Eastern boundary of 64m.

2.3 Topography

The Site slopes down from the east to the west towards South Creek and Narrabeen Lagoon with an approximate total fall to Pittwater Road of 6m. The ground levels across the Site generally follows the regional topography with no evidence of significant filling. However, there appears to have been some excavation at the rear of the existing building at the northern corner of the Site with a retaining wall constructed.

The area around the Site also slopes to the west being on the landward side of a coastal due formation. To the east of the Site the slope is the ridge of the dune formation where the slope changes to an easterly direction

2.4 Site Inspection

A walkover inspection of the Site was undertaken by ECS on 21 February 2020. The inspection was limited to accessible areas of the Site and immediate surrounds. An internal inspection of the building and structures was not undertaken.

2.4.1 Site Features

The existing structures on the Site are shown on Figure 2.2 with the Site outlined in red.

The building at 4 Albert Street, the most eastern building, is a medical practice which consists of a single storey brick building with a paved driveway from Albert Street and carpark in the northern portion of the property that occupies approximately one third of this premises.

The building at 2 Albert Street is a single storey residential dwelling of roughcast render and weatherboard with a tiled roof.

The building at 1300 Pittwater Road is commercial offices of cement render with a concrete paved driveway from Albert Street and parking in the rear.

The buildings at 1298 Pittwater Road, 1296 Pittwater Road and 1294 Pittwater Road are residential premises. The buildings at 1298 Pittwater Road and 1296 Pittwater Road consists of brick buildings and tiled roofing and 1294 Pittwater Road consists of cement render and tiled roofing.

At the time of this inspection, all residential and commercial buildings were occupied.

2.4.2 Heritage

The house at 2 Albert Street is listed as a heritage item (Item 89) in Warringah Local Environmental Plan (WLEP) 2011. The adjacent land to the east, Furlough House, is also

identified as a heritage item (Item 196) in WLEP 2011. Both properties are in use for residential purposes. Heritage listed premises are outlined in yellow in Figure 3.

Figure 2.2 – Site Layout

3.0 GEOLOGY AND HYDROGEOLOGY

3.1 Regional Geology

Regional geology of the area is shown on the Sydney 1:100 000 Geological Map Sheet 9130. The Site is located on medium to fine “marine” sand with quartz sand, minor shell content, interdune (swale) silt and fine sand.

3.2 Acid Sulfate Soil (ASS) Risk Planning

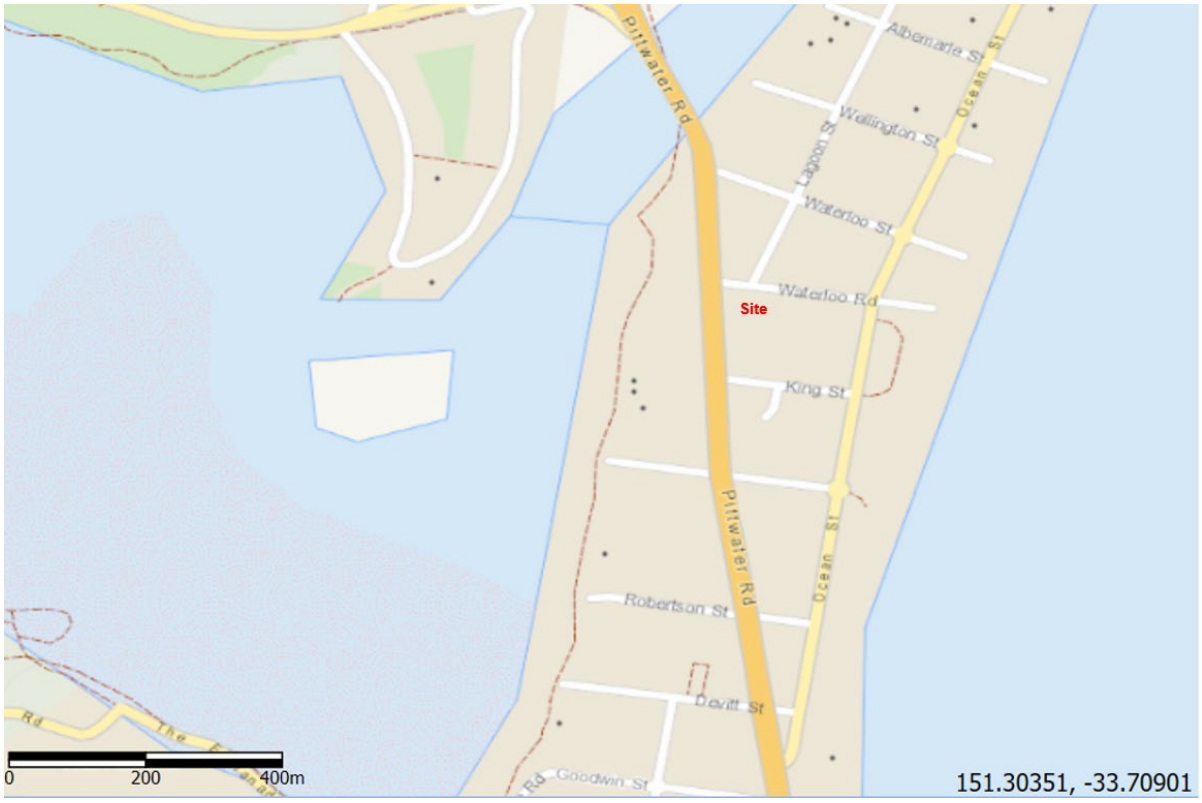
The Acid Sulfate Soils Map provided by the Warringah Council as part of the Warringah Local Environment Plan (LEP) 2011 show the Site is located within Class 4 ASS. The Warringah LEP outlines that development consent is required for the carrying out of works on Class 4 acid sulfate soils which includes “Works more than 2 metres below the natural ground surface and works by which the water table is likely to be lowered more than 2 metres below the natural ground surface”.

3.3 Hydrogeology

The nearest surface body of water is Narrabeen Lagoon with its channel located approximately 200m to the east of the Site. Narrabeen Lagoon discharges at Narrabeen Beach to the pacific ocean.

The Australian Groundwater Explorer data base shows that there are three registered groundwater bores approximately 200m to the south west of the Site. An extract from the Australian Groundwater Explorer is presented in Figure 3.1.

Figure 3.1 – Bore Locations



4.0 HISTORY REVIEW

To evaluate the development history of the Site, a Lotsearch report was undertaken for the Site. This Lotsearch report including aerial photographs which are included in Appendix 1.

4.1 Historical Aerial Photographs

Aerial photographs dating back to 1943 were reviewed to evaluate development on the Site. The Site features observed on the aerial photographs are summarised on Table 4.1.

Table 4.1 - Summary of Historical Aerial Photographs

Year	Details
1943	There appears to be residential dwellings on the northern boundary and on the southern boundary of the Site and a small structure (shed) in the north west corner of the Site. The rest of the site is vacant and grassed with some large mature trees in the approximate centre of the Site. The surrounding land use appears residential with potentially some commercial buildings directly north of the Site. There are scattered residential building on the neighbouring properties.
1956	The Site appears to have been divided into 4 sections with a commercial building at the north eastern corner and the houses observed on the 1943 photograph. The surrounding land use remains mostly the same. Residential buildings to the east of the Site have been modified and connected together.
1961	Three more buildings have been established on the Site. One building on the eastern boundary of the site which appears commercial, one building near the centre of the site (no. 1296 Pittwater Road) that appears residential and the building in the north west corner of the Site that was presumed to be a shed has now been established as a larger commercial style building. The surrounding land use remains relatively unchanged from the 1956 aerial photograph. There is also additional residential development to the south and commercial/industrial development to the north west of the Site.
1965	The Site remains relatively unchanged from the 1961 aerial photograph. The surrounding land remains relatively unchanged from the 1961 aerial photograph. Pittwater Road appears to have been widened into a multi-lane highway.
1970	The Site remains unchanged from the 1965 aerial photograph. The surrounding land use remains relatively unchanged from the 1965 aerial photograph. Five new residential buildings have been established to directly to the east of the Site. A large factory has been established to the north of the Site.
1982	The Site remains unchanged from the 1970 aerial photograph. The surrounding land use remains relatively unchanged from the 1970 aerial photograph.
1991	A residential building has been established near the centre of the Site (no. 1298 Pittwater Road) consisting of a house near the rear of the lot and a smaller building closer to the front of the lot that is a garage. The surrounding land use remains relatively unchanged from the 1982 aerial photograph.
2000	The Site remains unchanged from the 1991 aerial photograph. Development has occurred to the east of the Site, across Pittwater Road, where several buildings have been erected as a complex. A single large building has also erected north of the Site, across Albert Street, which appears to have multiple storeys, potentially for commercial or residential use. There is a vacant area under construction north of the Site.
2007	The Site remains unchanged from the 2000 aerial photograph. The area under construction in the 2000 aerial photograph has been developed into a large complex. The residential area directly south of the site has been developed into two complexes that appear to be strata residential premises.
2014	The Site remains unchanged from the 2007 aerial photograph.

Year	Details
	The surrounding land use remains relatively unchanged from the 2007 aerial photograph.
2019	The Site remains unchanged from the 2014 aerial photograph. The surrounding land use remains relatively unchanged from the 2014 aerial photograph.

4.2 NSW EPA Records

A review of the NSW Environment Protection Authority (EPA) databases was conducted including the following:

- Records maintained in relation to contaminated land under Section 58 of the CLM Act 1997;
- Records of sites notified to the EPA in accordance with the Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997 (2015);
- Licensed activities under the Protection of the Environment Operations Act (1997).

The review concluded that there were no records for the Site and the neighbouring properties.

4.3 History Summary

The aerial photographs indicate that the Site has been used for mixed residential and commercial purposes. The land use of the Site was solely residential with some sheds until 1961 when commercial premises were established on the Site. An owner and long term occupant of 1294 Pittwater Road confirmed the commercial building constructed on the eastern boundary was used as a warehouse prior to conversion to medical practice. The 1933 volume of the Sands Directory list occupants along Albert Street as including James Russell – carrier which appear to potentially corroborate the use of the commercial building.

5.0 CONCEPTUAL SITE MODEL

The National Environment Protection Measure (NEPM) for the Assessment of Site Contamination (NEPM 2013) defines a Conceptual Site Model (CSM) as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors.

The Planning Guidelines SEPP 55 – Remediation of Land (Department of Urban Affairs and Planning & Environment Protection Authority 1998) list activities that may result in land contamination. The history indicates that the Site has been used for residential purposes which is generally not considered to result in contamination and is not included on this list.

The potential Areas of Environmental Concern (AEC), contamination sources and Contaminants of Potential Concern (CPoC) are presented in Table 5.1 - Potential Contamination Sources/AEC.

Table 5.1 - Potential Contamination Sources/AEC

Source/AEC	CoPC	Likelihood	Comment
Use of pesticides – Pesticides may have been used beneath the buildings and impacted surface soils.	Heavy metals, OCP	Low	Buildings are generally of brick construction
Fill material – Importation of fill material of unknown origin may have been used to establish grades for construction of structures, driveways and carparks.	Heavy metals, TRH and OCP	Low	There is little evidence of filling on the Site
Spills and leaks from parked vehicles – Vehicles in carparks and driveways could spill on paved surfaces	TRH, BTEX, Lead	Low	Parking vehicles is a minor sources of contamination

Notes: TRH - Total Recoverable Hydrocarbons
BTEX - Benzene, Toluene, Ethyl-benzene and Xylenes (BTEX)
OCP - Organochlorine Pesticides
Heavy Metals – Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc

5.1 Mechanism for Contamination and Contaminated Media

The primary mechanisms for contamination from all AEC/sources are considered to be 'top-down' impacts such as leaching from surficial materials, spills or subsurface release. The potential contaminated media identified at the Site are surface soils across the Site.

5.2 Contaminant Receptors

The receptors of potential contamination are considered to be construction and maintenance workers involved in the proposed development and future occupants.

5.3 Potential Exposure Pathways

Potential exposure pathways relevant to human receptors at the development on the Site are identified as ingestion, dermal absorption and inhalation of dust.

6.0 DATA QUALITY OBJECTIVES

The Data Quality Objective (DQO) process is a systematic, seven-step process that defines the criteria an investigation should satisfy including; the type, quantity and quality of data required to support decisions relating to the investigation. DQOs for this investigation have been developed based on the seven-step approach in accordance with Appendix B of Schedule B2 of the NEPC (2013) - National Environment Protection Measure for the Assessment of Site Contamination.

The guidelines incorporate field quality control and laboratory analysis, methods and information on laboratory quality control data and validate the field and analytical data for this investigation. The DQOs are presented in detail in the following sections.

Step 1 - State the Problem

The Site requires evaluation of the suitability for proposed development and land use. This investigation needs to assess the surface soils/fill material across the Site for the contaminants of concern at concentrations above nominated Site Assessment Criteria (SAC).

Step 2 - Identify the Decisions

The primary decisions for this investigation are:

- Does historic land use identify potential sources of contamination;
- Are there concentrations of potential contaminants of concern detected in surface soils above the SAC; and
- Is the Site suitable for the proposed development?

Step 3 - Identify Inputs to the Decision

The inputs required to make the identified decisions include:

- A site inspection to evaluate for areas of environmental concern;
- A history review to evaluate the potential of contamination based on previous land use; and
- Methodical sampling across the Site to evaluate for the presence and nature of contamination in surface soils.

Step 4 - Define the Study Boundary

The lateral boundaries for this assessment have been identified as the Site boundary. The vertical boundary is the surface soils across the Site.

Step 5 - Develop a Decision Rules

The decision rules for this investigation are:

- If there is the potential for contamination that represents a risk to human health, then further assessment or remediation is required.

Step 6 - Specify Limits on Decision Errors

The acceptable limits on decision errors to be applied in this assessment and the manner of addressing possible decision errors are limited to the sampling results and laboratory analysis.

The DQOs for sampling techniques and laboratory analysis of collected soil samples defines the acceptable level of error required for this investigation.

The data quality objectives will be assessed by reference to data quality indicators as follows:

- Data Representativeness - expresses the degree which sample data accurately and precisely represents a characteristic of a population or an environmental condition. Consistent and repeatable sampling techniques and methods are utilised throughout the sampling.
- Completeness - defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid

data generated during the study. If there is insufficient valid data, then additional data are required to be collected.

- Comparability - is a qualitative parameter expressing the confidence with which one data set can be compared with another data set. This is achieved through maintaining a level of consistency in techniques used to collect samples and ensuring analysing laboratories use consistent analysis techniques and reporting methods.
- Precision - measures the reproducibility of measurements under a given set of conditions. The precision of the data is assessed by calculating the Relative Percent Difference (RPD) of duplicate samples. Duplicates will be assessed by calculating the Relative Percentage Difference (RPD) between the primary and duplicate samples.
- Accuracy - measures the bias in a measurement system. Accuracy can be undermined by such factors as field contamination of samples, poor preservation of samples, poor sample preparation techniques and poor selection of analysis techniques by the analysing laboratory. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards. Accuracy of field works is assessed by examining the level of contamination detected in equipment blanks.

Step 7 - Optimise the Design for Obtaining Data

The data sources for this assessment are historic records that have been maintained and that are readily available, soil and groundwater samples that are from methodical sampling locations established as the preliminary sampling plan.The distribution of sampling locations needs to consider the potential for contamination across the Site surface.

7.0 INVESTIGATION GUIDELINES

The NSW Environment Protection Authority (EPA) has issued a number of guidelines relevant to the assessment of contaminants in soil. These are used in conjunction with the National Environmental Protection Council (NEPC) (1999) - National Environment Protection (Assessment of Site Contamination) Measure 2013.

The National Environmental Protection Measure (NEPM) provides Health Investigation Levels (HILs) that are concentration levels, which have been tiered (provided in sets based on risk) for various exposure settings pertaining to land uses.

The HILs for the land use type considered in NEPM include:

- HIL A – residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake, (no poultry), also includes children's day care centres, preschools and primary schools
- HIL B – residential with minimal opportunities for soil access includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats
- HIL C – public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. It does not include undeveloped public open space (such as urban bushland and reserves) which should be subject to a site-specific assessment where appropriate
- HIL D – commercial/industrial such as shops, offices, factories and industrial sites.

Health Screening Levels (HSLs) for various petroleum hydrocarbon compounds have also been developed. The HSLs also relate to the land use (consistent with the HILs) and are dependent on soil type and depth.

The land use at this Site is proposed to be mixed residential and commercial with some opportunity for soil access so the conservative HILs have been adopted for this assessment being the HIL A levels. The relevant HILs are summarised in Table 7.1.

These Site Assessment Criteria are not derived as acceptance criteria for contamination at a site, but as levels above which specific consideration of risk, based on the site use and potential exposure, is required. If a risk is determined as present, then remediation and/or management must be undertaken.

Table 7.1 – Site Assessment Criteria

Contaminant	Site Assessment Criteria (mg/kg)
Total Recoverable Hydrocarbons (TRH)	
Naphthalene	3[1]
TRH C6-C10 (F1)	45[1]
TRH C10-C16 (F2)	110[1]
Monocyclic Aromatic Hydrocarbons	
Benzene	0.5[1]
Toluene	160[1]
Ethylbenzene	55[1]
Xylene (total)	40[1]
Heavy Metals	
Arsenic	100
Cadmium	20
Chromium (VI)	100
Copper	6 000
Lead	300
Mercury	4
Nickel	400
Zinc	7 400
Organochlorine Pesticides	
DDT+DDE+DDD	240
Aldrin and dieldrin	6
Chlordane	50
Endosulfan	270
Endrin	10
Heptachlor	6
HCB	10
Methoxychlor	300
Toxaphene	20

Notes: All concentrations in mg/kg
1. Health screening levels for clay soils over the depth interval 0-1m
2. Carcinogenic PAHs based on the 8 carcinogenic PAHs.

8.0 SITE INVESTIGATION

Three potential areas of environmental concern have been identified associated with potential past Site usage. To evaluate for contamination and for the presence of fill the following scope of work was undertaken:

- Inspection of the Site to confirm for the presence of filling:
- Excavation of 7 shallow test pit and drilling of 2 boreholes located in a methodical distribution across the Site;
- The collection of 1 discrete surface soil sample from each of the test pits the boreholes and a natural soil sample at 3m depth from each borehole;
- The analysis of all samples for heavy metals, OCP, BTEX and TRH; and
- The analysis of a selected sample from one of the boreholes for acid sulfate soil (ASS) parameters.

The rationale for environmental sampling locations was based on the probability that surface impact may be impacted from former residential land use and on the basis there was a probability (all be it low) of fill on parts of the Site. The sampling density was established based on the *Sampling Design Guidelines* (NSW EPA 1995).

8.1 Site Inspection

The Site inspection did not identify any areas where there was significant fill material. Some areas where there had been excavation to form level building platforms were noted. Surface soils appeared to represent disturbed natural material consistent with residential use of the land.

8.2 Assessment Method

To characterise the surface soil across the Site 7 shallow test pits were excavated by hand. Soils samples were collected from each test pit targeting the upper 200mm of strata. In addition soil samples were collected from 2 boreholes drilled at the Site. These samples were collected directly from the auger.

Each sample was then transferred into a laboratory prepared sample jar. All sample locations were recorded in the field and composite samples were logged onto a chain of custody.

Test pit locations were numbered TP1 to TP7 and boreholes Numbered BH1 and BH2. Soil samples from the test pits were assigned the test pit number for identification and the samples from the boreholes assigned the borehole number and sample depth.

The locations of the test pits and boreholes are presented on Figure 8.1 – Sample Location Plan. The subsurface conditions encountered at each location are summarised in Table 8.1 – Subsurface Conditions.

Figure 8.1 – Sample Location Plan

Table 8.1 – Subsurface Conditions

Location	Depth (m)	Description
TP1	0-0.2	Silty sand – dark brown
TP2	0-0.2	Silty sand – dark brown
TP3	0-0.2	Silty sand – dark brown
TP4	0-0.2	Silty sand – dark brown
TP5	0-0.2	Silty sand – dark brown
TP6	0-0.2	Silty sand – dark brown
TP7	0-0.2	Silty sand – dark brown
BH1	0.3	Silty sand – dark brown
	3.0	Silty sand – yellow
BH2	0.3	Silty sand – dark brown
	3.0	Silty sand – white

9.0 RESULTS

The results of soil analysis are summarised on Table 9.1 and the Laboratory report provided in Appendix 2 . Included in this table are the SAC (HIL/HSLs with the lowest most conservative numbers selected). The results of analysis of all soil samples indicated concentrations of all contaminants below the SAC for residential land use.

The soil sample from borehole BH1 at 3m depth was selected for ASS evaluation. This sample was selected as it was considered representative of the sand material encountered during the investigation and was within the basement excavation envelope.

Observations during drilling activities did not identify strata considered to potentially represent ASS and the results of testing did not identify ASS.

Table 9.1 – Summary of Soil Results

Contaminant	TP1	TP2	TP3	TP4	TP5	TP6	TP7	BH1/0.3	BH1/3.0	BH2/0.3	BH2/3.0	SAC (mg/kg)
Total Recoverable Hydrocarbons (TRH)												
Naphthalene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	3[1]
TRH C6-C10 (F1)	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	45[1]
TRH C10-C16 (F2)	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	110[1]
Monocyclic Aromatic Hydrocarbons												
Benzene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.5[1]
Toluene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	160[1]
Ethylbenzene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	55[1]
Xylene (total)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	40[1]
Heavy Metals												
Arsenic	9.1	17	16	2.3	11	11	10	16	2.9	16	9.6	100
Cadmium	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	20
Chromium (VI)	17	32	7	< 5	11	14	12	13	11	14	8.8	100
Copper	13	17	< 5	5.6	16	9.5	15	7.8	13	5.6	7.1	6 000
Lead	18	7	< 5	17	51	220	54	10	20	8.6	33	300
Mercury	< 0.1	< 0.1	< 0.1	< 0.1	0.6	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	4
Nickel	13	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6	< 5	< 5	400
Zinc	43	23	16	34	120	210	72	24	48	18	66	7 400
Organochlorine Pesticides												
DDT+DDE+DDD	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	240
Aldrin and dieldrin	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	1.42	0.1	6
Chlordane	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	50
Endosulfan	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	270
Endrin	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	10
Heptachlor	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	6
HCB	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	10
Methoxychlor	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	300
Toxaphene	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	20

10.0 CONCLUSION

The Site has been predominantly used for residential purposes although there is a commercial building on the eastern boundary and at the northern corner of the Site. The commercial buildings have been used for office activities and as a medical centre. Historically it is considered the commercial building on the eastern boundary was used as a warehouse. The history of the Site does not indicate a significant potential for Site contamination.

Inspection of the Site has not indicated evidence of contamination or filling. However to further evaluate for impacts from past residential activities, methodical sampling was undertaken. Soil sampling has been undertaken based on EPA guidelines. This sampling did not indicate the presence of potential contaminants above Site Assessment Criteria.

The following conclusions can be made, based on this investigation, regarding conditions at the Site and the suitability of the Site for residential use and redevelopment:

- The history has indicated a low potential for contamination resulting from use of the Site when considering the proposed development;
- The results of soil sample analysis show that the surface soils on the Site do not contain concentrations of the contaminants of concern above the relevant Site Assessment Criteria; and
- ASS are not likely to be encountered and require management during development.

The Site is considered suitable for the proposed development for residential use.

APPENDIX 1

LOTSEARCH

LOTSEARCH AERIALS

Date: 26 Feb 2020

Reference: LS011388 EA

Address: 1294-1300 Pittwater Road & 2-4 Albert Street, Narrabeen, NSW 2101

Aerial Imagery 2019

1294-1300 Pittwater Road & 2-4 Albert Street, Narrabeen, NSW 2101

Aerial Imagery 2014

1294-1300 Pittwater Road & 2-4 Albert Street, Narrabeen, NSW 2101

Aerial Imagery 2007

1294-1300 Pittwater Road & 2-4 Albert Street, Narrabeen, NSW 2101

Scale:	Data Sources: Aerial Imagery © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 26 February 2020

0 25 50 75 100 Meters

Aerial Imagery 2000

1294-1300 Pittwater Road & 2-4 Albert Street, Narrabeen, NSW 2101

Aerial Imagery 1991

1294-1300 Pittwater Road & 2-4 Albert Street, Narrabeen, NSW 2101

Aerial Imagery 1982

1294-1300 Pittwater Road & 2-4 Albert Street, Narrabeen, NSW 2101

Data Sources: Aerial Imagery © Department of Finance, Services & Innovation

Coordinate System: GDA 1994 MGA Zone 56

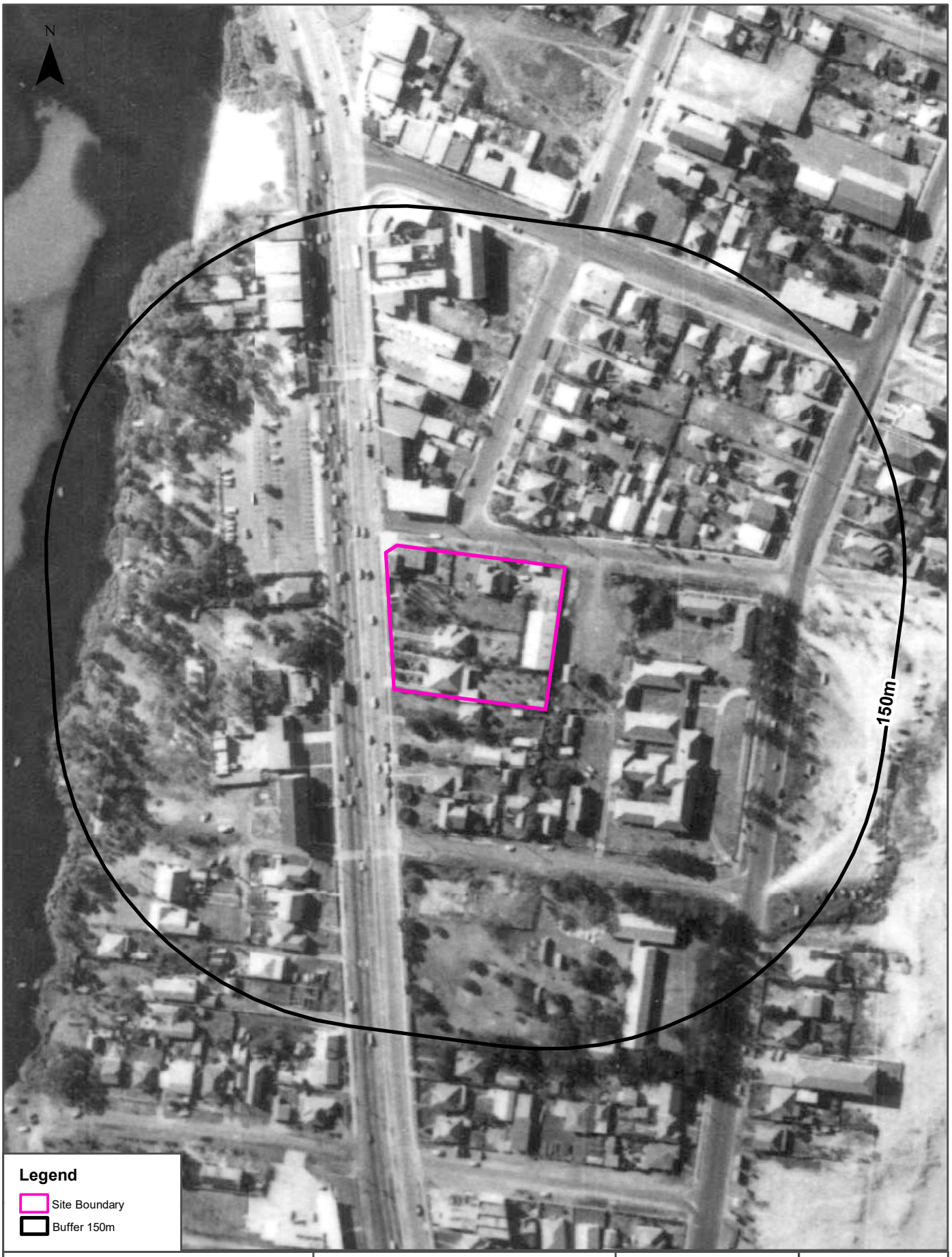
Date: 26 February 2020

Aerial Imagery 1970

1294-1300 Pittwater Road & 2-4 Albert Street, Narrabeen, NSW 2101

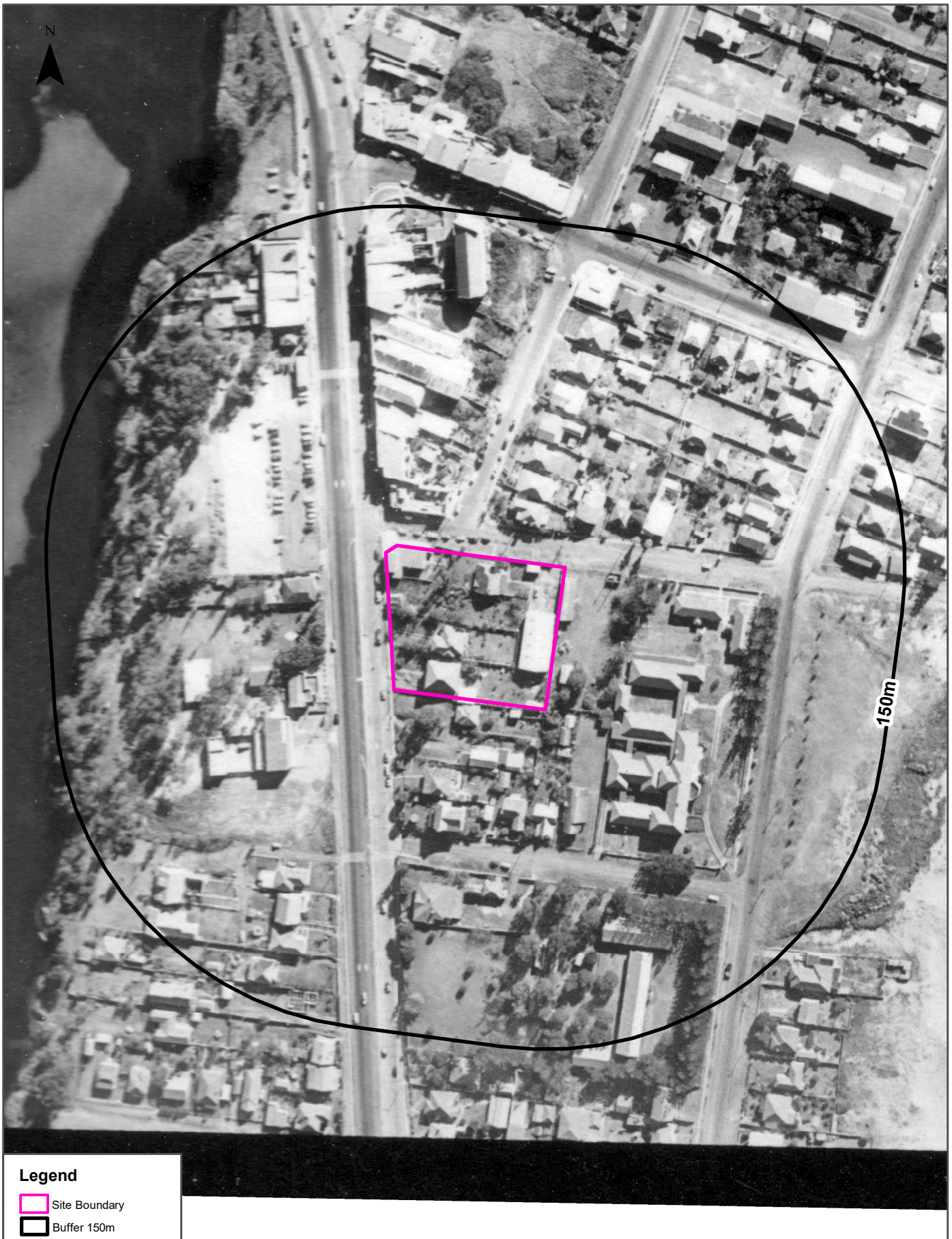
Aerial Imagery 1965

1294-1300 Pittwater Road & 2-4 Albert Street, Narrabeen, NSW 2101



Aerial Imagery 1961

1294-1300 Pittwater Road & 2-4 Albert Street, Narrabeen, NSW 2101



Scale: 0 25 50 75 100 Meters

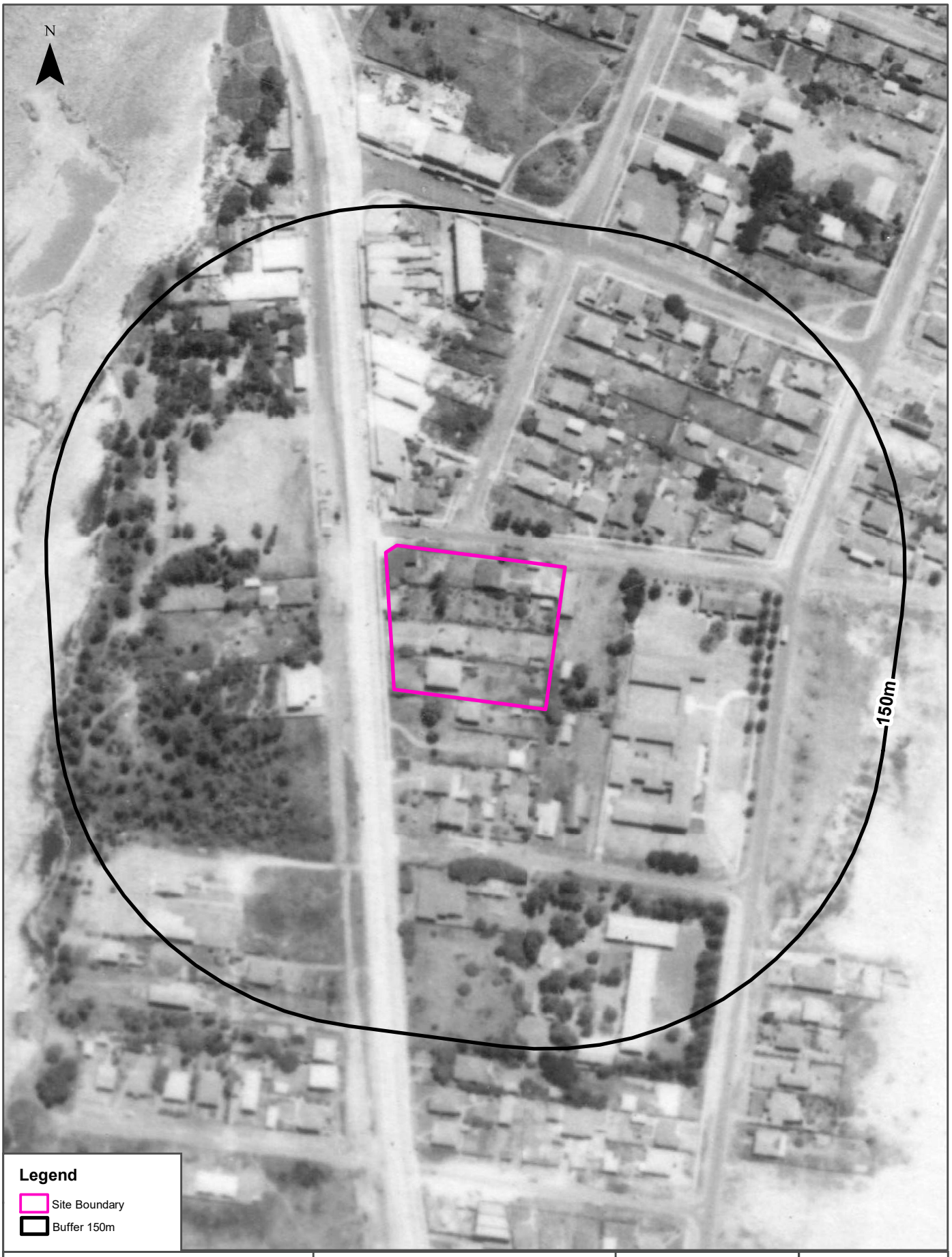
Data Source Aerial Imagery:
© NSW Department Finance, Services & Innovation

Coordinate System:
GDA 1994 MGA Zone 56

Date: 25 February 2020

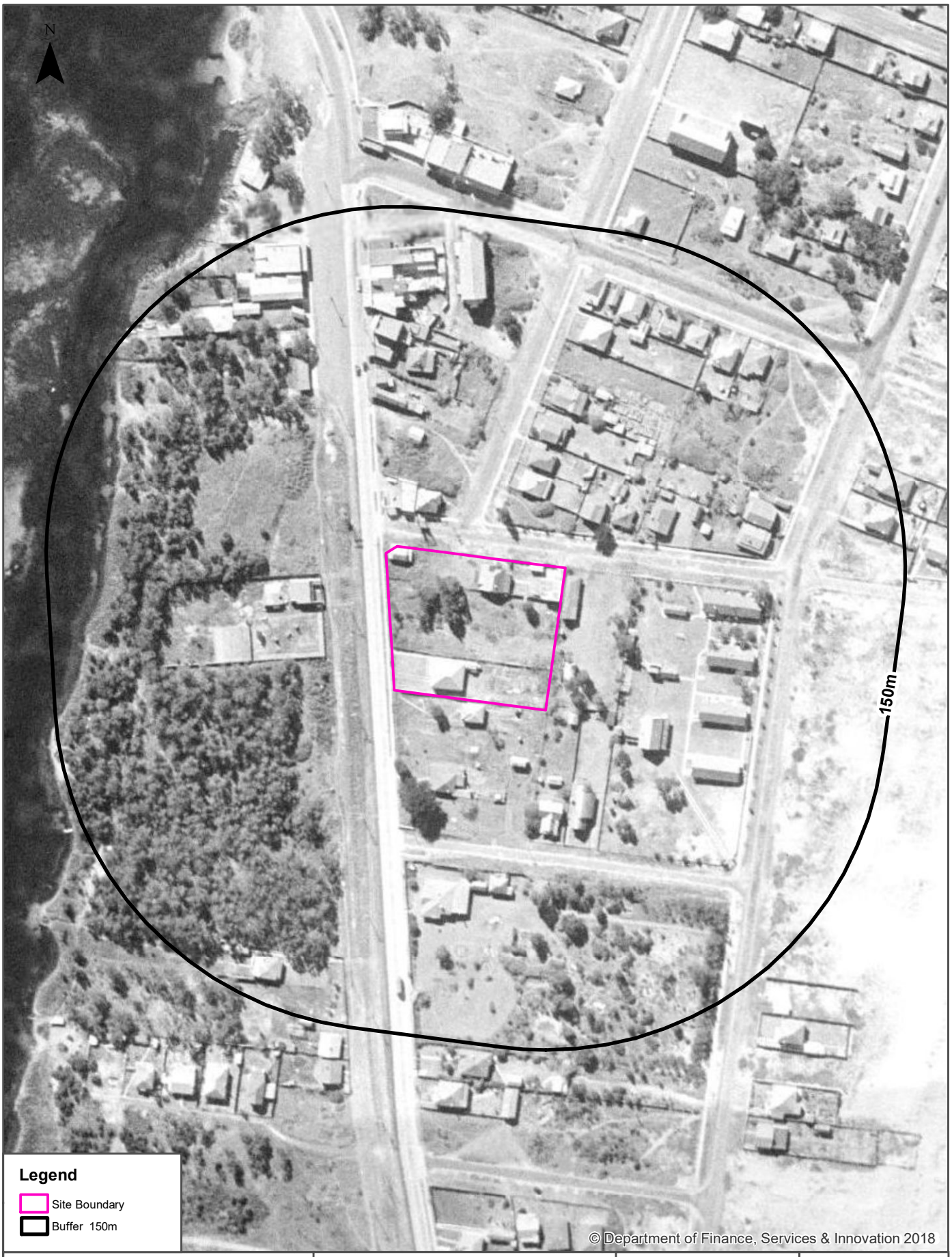
Aerial Imagery 1956

1294-1300 Pittwater Road & 2-4 Albert Street, Narrabeen, NSW 2101



Aerial Imagery 1943

1294-1300 Pittwater Road & 2-4 Albert Street, Narrabeen, NSW 2101



Scale:	Data Sources: Aerial Imagery © Department of Finance, Services & Innovation	Coordinate System: GDA 1994 MGA Zone 56	Date: 26 February 2020

0 25 50 75 100 Meters

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APPENDIX 2

Environmental Consulting Services Grp
118A Australia Street
Camperdown
NSW 2050

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Simon Caples**

Report **705204-S**
Project name NARRABEEN
Received Date Mar 02, 2020

Client Sample ID			**BH1/0.3**	**BH1/3.0**	**BH2/3.0**	**TP1**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Ma01229**	**S20-Ma01230**	**S20-Ma01231**	**S20-Ma01232**
Date Sampled			**Mar 02, 2020**	**Mar 02, 2020**	**Mar 02, 2020**	**Mar 02, 2020**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	56	65	106	114
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	0.10	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05

Client Sample ID			BH1/0.3	BH1/3.0	BH2/3.0	TP1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Ma01229	S20-Ma01230	S20-Ma01231	S20-Ma01232
Date Sampled			Mar 02, 2020	Mar 02, 2020	Mar 02, 2020	Mar 02, 2020
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	0.1	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dibutylchlorendate (surr.)	1	%	72	73	78	71
Tetrachloro-m-xylene (surr.)	1	%	73	79	80	80
Heavy Metals						
Arsenic	2	mg/kg	9.1	17	16	2.3
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	17	32	7.0	< 5
Copper	5	mg/kg	13	17	< 5	5.6
Lead	5	mg/kg	18	7.0	< 5	17
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	13	< 5	< 5	< 5
Zinc	5	mg/kg	43	23	16	34
Chromium Suite						
pH-KCL	0.1	pH Units	-	7.9	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	< 2	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	< 0.003	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	0.032	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	20	-	-
Sulfur - KCl Extractable	0.02	% S	-	n/a	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	0.32	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	64	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	0.10	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
Extraneous Material						
<2mm Fraction	0.005	g	-	89	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	9.0	17	< 1	5.0

Client Sample ID			TP2	TP3	TP4	TP5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Ma01233	S20-Ma01234	S20-Ma01235	S20-Ma01236
Date Sampled			Mar 02, 2020	Mar 02, 2020	Mar 02, 2020	Mar 02, 2020
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	109	77	100	114
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dibutylchlorendate (surr.)	1	%	72	82	64	74
Tetrachloro-m-xylene (surr.)	1	%	78	81	75	78

Client Sample ID			TP2	TP3	TP4	TP5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Ma01233	S20-Ma01234	S20-Ma01235	S20-Ma01236
Date Sampled			Mar 02, 2020	Mar 02, 2020	Mar 02, 2020	Mar 02, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	11	11	10	16
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	11	14	12	13
Copper	5	mg/kg	16	9.5	15	7.8
Lead	5	mg/kg	51	220	54	10
Mercury	0.1	mg/kg	0.6	0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	120	210	72	24
% Moisture	1	%	3.9	3.0	8.7	2.2

Client Sample ID			TP6	TP7	BH2/0.3
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			S20-Ma01237	S20-Ma01238	S20-Ma01239
Date Sampled			Mar 02, 2020	Mar 02, 2020	Mar 02, 2020
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	20	mg/kg	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50
BTEX					
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	83	102	85
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100
Organochlorine Pesticides					
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	0.12
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05

Client Sample ID			TP6	TP7	BH2/0.3
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			S20-Ma01237	S20-Ma01238	S20-Ma01239
Date Sampled			Mar 02, 2020	Mar 02, 2020	Mar 02, 2020
Test/Reference	LOR	Unit			
Organochlorine Pesticides					
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	1.3
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	< 0.2
Toxaphene	1	mg/kg	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	1.42
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.2	< 0.2	1.42
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.2	< 0.2	< 0.2
Dibutylchlorendate (surr.)	1	%	66	69	85
Tetrachloro-m-xylene (surr.)	1	%	74	79	77
Heavy Metals					
Arsenic	2	mg/kg	2.9	16	9.6
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	11	14	8.8
Copper	5	mg/kg	13	5.6	7.1
Lead	5	mg/kg	20	8.6	33
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	6.0	< 5	< 5
Zinc	5	mg/kg	48	18	66
% Moisture	1	%	4.7	2.2	2.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B6			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Mar 05, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Mar 05, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Mar 05, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Mar 05, 2020	
- Method: LTM-ORG-2010 TRH C6-C40			
Metals M8	Sydney	Mar 05, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Organochlorine Pesticides	Sydney	Mar 05, 2020	14 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Chromium Reducible Sulfur Suite			
Chromium Suite	Brisbane	Mar 05, 2020	6 Week
- Method: LTM-GEN-7070 Chromium Reducible Sulfur Suite			
Extraneous Material	Brisbane	Mar 05, 2020	6 Week
- Method: LTM-GEN-7050/7070			
% Moisture	Sydney	Mar 02, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

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NATA # 1261 Site # 20794

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Company Name: Diversified Grp P/L-T/a Enviro Consult Serv Grp
Address: 118A Australia Street
Camperdown
NSW 2050

Project Name: NARRABEEN

Order No.:
Report #: 705204
Phone: 1800 099 880
Fax:

Received: Mar 2, 2020 3:00 PM
Due: Mar 9, 2020
Priority: 5 Day
Contact Name: Simon Caples

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail						Organochlorine Pesticides	Chromium Reducible Sulfur Suite	Moisture Set	Eurofins | mgt Suite B6
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217						X		X	X
Brisbane Laboratory - NATA Site # 20794							X		
Perth Laboratory - NATA Site # 23736									
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	BH1/0.3	Mar 02, 2020		Soil	S20-Ma01229	X		X	X
2	BH1/3.0	Mar 02, 2020		Soil	S20-Ma01230	X	X	X	X
3	BH2/3.0	Mar 02, 2020		Soil	S20-Ma01231	X		X	X
4	TP1	Mar 02, 2020		Soil	S20-Ma01232	X		X	X
5	TP2	Mar 02, 2020		Soil	S20-Ma01233	X		X	X
6	TP3	Mar 02, 2020		Soil	S20-Ma01234	X		X	X
7	TP4	Mar 02, 2020		Soil	S20-Ma01235	X		X	X
8	TP5	Mar 02, 2020		Soil	S20-Ma01236	X		X	X
9	TP6	Mar 02, 2020		Soil	S20-Ma01237	X		X	X
10	TP7	Mar 02, 2020		Soil	S20-Ma01238	X		X	X
11	BH2/0.3	Mar 02, 2020		Soil	S20-Ma01239	X		X	X

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Project Name: NARRABEEN

Order No.:
Report #: 705204
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Received: Mar 2, 2020 3:00 PM
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Priority: 5 Day
Contact Name: Simon Caples

Eurofins Analytical Services Manager : Alena Bounkeua

Sample Detail	Organochlorine Pesticides	Chromium Reducible Sulfur Suite	Moisture Set	Eurofins | mgt Suite B6
Melbourne Laboratory - NATA Site # 1254 & 14271				
Sydney Laboratory - NATA Site # 18217	X		X	X
Brisbane Laboratory - NATA Site # 20794		X		
Perth Laboratory - NATA Site # 23736				
Test Counts	11	1	11	11

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	73			70-130	Pass	
TRH C10-C14	%	83			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	85			70-130	Pass	
Toluene	%	85			70-130	Pass	
Ethylbenzene	%	82			70-130	Pass	
m&p-Xylenes	%	81			70-130	Pass	
o-Xylene	%	81			70-130	Pass	
Xylenes - Total	%	81			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	121			70-130	Pass	
TRH C6-C10	%	76			70-130	Pass	
TRH >C10-C16	%	78			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDD	%	75			70-130	Pass	
4.4'-DDE	%	71			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endosulfan I	%	73			70-130	Pass	
Endosulfan sulphate	%	73			70-130	Pass	
Heptachlor epoxide	%	79			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	95			70-130	Pass	
Cadmium	%	93			70-130	Pass	
Chromium	%	102			70-130	Pass	
Copper	%	108			70-130	Pass	
Lead	%	103			70-130	Pass	
Mercury	%	109			70-130	Pass	
Nickel	%	107			70-130	Pass	
Zinc	%	106			70-130	Pass	
LCS - % Recovery							
Chromium Suite							
pH-KCL	%	100			80-120	Pass	
Acid trail - Titratable Actual Acidity	%	104			80-120	Pass	
Chromium Reducible Sulfur	%	97			80-120	Pass	
Acid Neutralising Capacity (ANCbt)	%	94			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	S20-Ma00696	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	S20-Ma00696	NCP	%	91			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	S20-Ma10216	NCP	%	85			70-130	Pass	
4.4'-DDD	S20-Ma10216	NCP	%	83			70-130	Pass	
4.4'-DDE	S20-Ma10216	NCP	%	92			70-130	Pass	
4.4'-DDT	S20-Ma10216	NCP	%	100			70-130	Pass	
a-BHC	S20-Ma10216	NCP	%	114			70-130	Pass	
Aldrin	S20-Ma10216	NCP	%	95			70-130	Pass	
b-BHC	S20-Ma10216	NCP	%	115			70-130	Pass	
d-BHC	S20-Ma10216	NCP	%	117			70-130	Pass	
Dieldrin	S20-Ma10216	NCP	%	101			70-130	Pass	
Endosulfan I	S20-Ma10216	NCP	%	80			70-130	Pass	
Endosulfan II	S20-Ma10216	NCP	%	106			70-130	Pass	
Endosulfan sulphate	S20-Ma10216	NCP	%	93			70-130	Pass	
Endrin	S20-Ma10216	NCP	%	93			70-130	Pass	
Endrin aldehyde	S20-Ma10216	NCP	%	91			70-130	Pass	
Endrin ketone	S20-Ma10216	NCP	%	91			70-130	Pass	
g-BHC (Lindane)	S20-Ma10216	NCP	%	118			70-130	Pass	
Heptachlor	S20-Ma10216	NCP	%	113			70-130	Pass	
Heptachlor epoxide	S20-Ma10216	NCP	%	79			70-130	Pass	
Hexachlorobenzene	S20-Ma10216	NCP	%	109			70-130	Pass	
Methoxychlor	S20-Ma10216	NCP	%	80			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S20-Ma01230	CP	%	87			70-130	Pass	
Cadmium	S20-Ma01230	CP	%	94			70-130	Pass	
Chromium	S20-Ma01230	CP	%	88			70-130	Pass	
Copper	S20-Ma01230	CP	%	93			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Lead	S20-Ma01230	CP	%	99			70-130	Pass	
Mercury	S20-Ma01230	CP	%	110			70-130	Pass	
Nickel	S20-Ma01230	CP	%	104			70-130	Pass	
Zinc	S20-Ma01230	CP	%	96			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S20-Ma01235	CP	%	70			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S20-Ma01235	CP	%	87			70-130	Pass	
Toluene	S20-Ma01235	CP	%	88			70-130	Pass	
Ethylbenzene	S20-Ma01235	CP	%	86			70-130	Pass	
m&p-Xylenes	S20-Ma01235	CP	%	84			70-130	Pass	
o-Xylene	S20-Ma01235	CP	%	85			70-130	Pass	
Xylenes - Total	S20-Ma01235	CP	%	84			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S20-Ma01235	CP	%	126			70-130	Pass	
TRH C6-C10	S20-Ma01235	CP	%	73			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	S20-Ma00679	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S20-Ma00679	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S20-Ma00679	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	S20-Ma00679	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S20-Ma00679	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S20-Ma00679	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S20-Ma10211	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S20-Ma10211	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S20-Ma10211	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Toxaphene	S20-Fe41978	NCP	mg/kg	< 1	< 1	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S20-Ma01229	CP	mg/kg	9.1	4.6	66	30%	Fail	Q15
Cadmium	S20-Ma01229	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S20-Ma01229	CP	mg/kg	17	16	10	30%	Pass	
Copper	S20-Ma01229	CP	mg/kg	13	9.8	30	30%	Pass	
Lead	S20-Ma01229	CP	mg/kg	18	15	20	30%	Pass	
Mercury	S20-Ma01229	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S20-Ma01229	CP	mg/kg	13	10	22	30%	Pass	
Zinc	S20-Ma01229	CP	mg/kg	43	37	15	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Ma00722	NCP	%	12	12	5.0	30%	Pass	
Duplicate									
Chromium Suite				Result 1	Result 2	RPD			
pH-KCL	S20-Ma01230	CP	pH Units	7.9	7.9	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	S20-Ma01230	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	S20-Ma01230	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
Chromium Reducible Sulfur	S20-Ma01230	CP	% S	0.032	0.034	5.0	30%	Pass	
Chromium Reducible Sulfur -acidity units	S20-Ma01230	CP	mol H+/t	20	21	5.0	30%	Pass	
Sulfur - KCl Extractable	S20-Ma01230	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	S20-Ma01230	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	S20-Ma01230	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	S20-Ma01230	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	S20-Ma01230	CP	% CaCO3	0.32	0.32	1.0	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	S20-Ma01230	CP	% S	0.10	0.10	1.0	30%	Pass	
ANC Fineness Factor	S20-Ma01230	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	S20-Ma01230	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	S20-Ma01230	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	S20-Ma01230	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S20-Ma01234	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S20-Ma01234	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S20-Ma01234	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S20-Ma01234	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S20-Ma01234	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S20-Ma01234	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S20-Ma01234	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S20-Ma01234	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S20-Ma01234	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S20-Ma01239	CP	mg/kg	9.6	11	14	30%	Pass	
Cadmium	S20-Ma01239	CP	mg/kg	< 0.4	4.1	180	30%	Fail	Q15
Chromium	S20-Ma01239	CP	mg/kg	8.8	8.3	6.0	30%	Pass	
Copper	S20-Ma01239	CP	mg/kg	7.1	5.9	19	30%	Pass	
Lead	S20-Ma01239	CP	mg/kg	33	25	28	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Mercury	S20-Ma01239	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S20-Ma01239	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	S20-Ma01239	CP	mg/kg	66	48	31	30%	Fail	Q15

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

Authorised By

Alena Bounkeua	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)
Myles Clark	Senior Analyst-SPOCAS (QLD)

Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Sample Receipt Advice

Company name:	**Diversified Grp P/L-T/a Enviro Consult Serv Grp**
Contact name:	Simon Caples
Project name:	NARRABEEN
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Mar 2, 2020 3:00 PM
Eurofins reference:	**705204**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☒ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Alena Bounkeua on Phone : or by e.mail: AlenaBounkeua@eurofins.com

Results will be delivered electronically via e.mail to Simon Caples - simon@ecsgroup.com.au.

Note: A copy of these results will also be delivered to the general Diversified Grp P/L-T/a Enviro Consult Serv Grp email address.

diversified
group pty ltd

Chain of Custody

705204

Project	NARRABEEN																						
Diversified Group Pty Ltd						Manager: Simon Caples						Ph: 0415 225 474				Email: simon@ecsgroup.com.au							
Event Number:			Matrix			Analysis																	
Lab Number	Sample Number	Sample Date	Soil	Water	Other	BTEX	TPH	PAH	Phenol	Ammonia	Cyanide	Metals	TCLP Metals	Asbestos	OCP	CRS							
	BH1/0.3	2/3	x			x	x					x			x								
	BH1/3.0		x													x							
	BH2/0.3		x																				
	BH2/3.0		x													x							
	TP1		x																				
	TP2		x																				
	TP3		x																				
	TP4		x																				
	TP5		x																				
	TP6		x																				
	TP7		x																				

Metals: As Cd Cr Cu Ni Pb Zn Hg

Comments:

Relinquished By:	Simon	Signed:		Date:	2/3	Received By:	Lynne Pond	Signed:		Date:	2/3/2020 3:00pm